KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

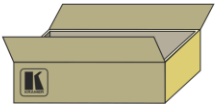
VS-48HN
4x8 HDMI Matrix Switcher

P/N: 2900-300153 Rev 8

VS-48HN Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box



- **VS-48HN** 4x8 HDMI Matrix Switcher
- 1 Power cord
- 1 Set of rack "ears"
- 1 Quick Start Guide
- 4 Rubber feet
- Kramer RC-IR3 Infrared Remote Control Transmitter with batteries and user manual

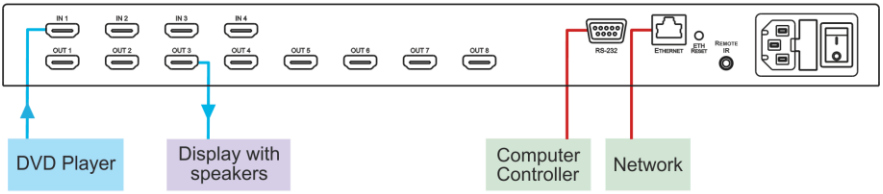
Save the original box and packaging in case your **VS-48HN** needs to be returned to the factory for service.

Step 2: Install the VS-48HN

Mount the machine in a rack (using the included rack "ears") or attach the rubber feet and place on a table.

Step 3: Connect the inputs and outputs

Always switch off the power on each device before connecting it to your **VS-48HN**.



Always use Kramer high-performance cables for connecting AV equipment to the **VS-48HN**.

Step 4: Connect the power

Connect the power cord to the **VS-48HN** and plug it into the mains electricity.

Step 5: Operate the VS-48HN

Switch an Input to an Output

- ❒ Press an output button followed by an input button to switch the pair

Acquire the EDID from an Output

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
2. Press the input button to which the EDID is to be copied.
3. Select the output from which the EDID is to be acquired.
4. Press the EDID button.

Set the EDID to Default

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
2. Press the input button to which the EDID is to be copied.
3. Press the OFF button until "0" (zero) appears on the display.
4. Press the EDID button.

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Congratulations on purchasing your Kramer **VS-48HN** *4x8 HDMI Matrix Switcher*, which is ideal for the following typical applications:

- Conference room presentations
- Advertising applications
- Rental and staging

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **VS-48HN** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the power cord that is supplied with the unit

Warning: Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

The **VS-48HN** is a high quality 4x8 matrix switcher for HDMI signals. It reclocks and equalizes the signal and can route any input to any or all outputs simultaneously.

In particular, the **VS-48HN** features:

- Up to 6.75Gbps data rate (2.25Gbps per graphics channel)
  Suitable for resolutions up to UXGA at 60Hz and for all HD resolutions.
- Support for HDCP (High Definition Digital Content Protection)
- HDMI support for 3D, Deep Color, x.v.Color™, Lip Sync
- 3D pass-through
- HDMI Support - HDMI support for Deep Color, x.v.Color™, Dolby® TrueHD, Dolby Digital Plus, DTS−HD®, and linear PCM 7.1 surround sound
- Kramer reKlocking™ & Equalization Technology that rebuilds the digital signal to travel longer distances
- A lock button to prevent unwanted tampering with the buttons on the front panel
- 12 Preset memory locations for quick access to common configurations

You can control the **VS-48HN** using the front panel buttons, or remotely via:

- RS-232 serial commands transmitted by a PC, touch screen system or other serial controller
- The Kramer infrared remote control transmitter
- A PC connected to the Ethernet port on the device via a LAN
- An external remote IR receiver (optional), see Section 3.3

3.1 About Fast Switching

Older display devices required a longer time between the loss of one digital signal and the introduction of another, as well as a physical disconnection of the interconnecting cable in order to be able to detect and adjust to the new video attributes and parameters. Normal switching, therefore, introduced a 5V signal disconnection along with a delay in switching. Many newer display devices, however, are now capable of “on-the-fly” switching.

Depending on the display device in use, the **VS-48HN** allows for fast switching (minor reset and the connection kept alive) and extra fast switching (no reset and the connection kept alive). Using the fast and extra fast switching modes allows for fraction-of-a-second switching times when using high performance display devices or when using a scaler on the video output.

3.2 Defining the VS-48HN 4x8 HDMI Matrix Switcher

This section defines the **VS-48HN**.

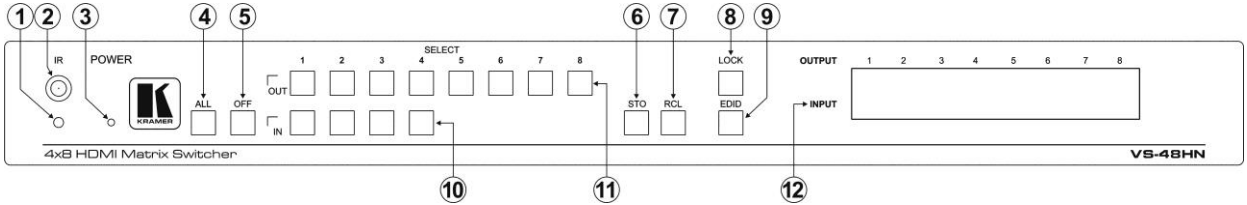


Figure 1: VS-48HN 4x8 HDMI Matrix Switcher Front Panel

#	Feature		Function
1	*IR* Indication LED		Lights yellow when receiving signals from the infrared remote control transmitter
2	*IR* Receiver		Signal receiver for the infrared remote control transmitter
3	*POWER* LED		Lights when the device is turned on
4	*ALL* Button		Press followed by an input button to connect the selected input to all outputs For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs
5	*OFF* Button		Press after pressing an output button to disconnect the selected output from the inputs. To disconnect all the outputs, press ALL followed by OFF
6	*STO* Button		Press to store the current switching setting to a preset (see Section 6.3)
7	*RCL* Button		Press to recall the current switching setting from a preset (see Section 6.3)
8	*LOCK* Button		Press and hold to toggle the locking/release of the front panel buttons. When storing or recalling presets, press to store or recall the preset (see Section 6.3)
9	*EDID* Button		Press to capture the EDID (see Section 6.2)
10	*SELECT* Buttons	*IN* (1 to 4)	Press to select the input to switch after selecting an output (also used for storing machine setups (see Section 6.3)
11		*OUT* (1 to 8)	Press to select an output to switch followed by an input (also used for storing machine setups (see Section 6.3)
12	*INPUT* 7-segment LED Display		Displays the input currently switched to the output which is marked above each input

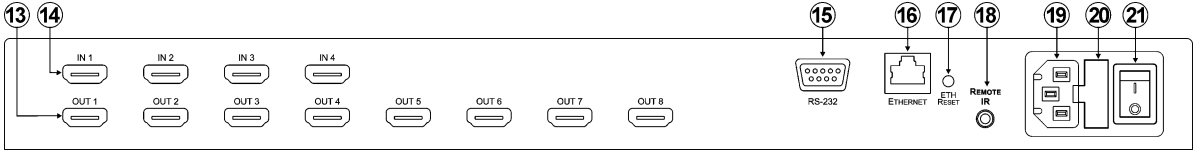


Figure 2: VS-48HN 4x8 HDMI Matrix Switcher Rear Panel

#	Feature	Function
13	*OUT* HDMI Connectors (1 to 8)	Connect to up to 8 HDMI acceptors
14	*IN* HDMI Connectors (1 to 4)	Connect to up to 4 HDMI sources
15	*RS-232* 9-pin D-sub Serial Port Connector	Connect to a PC/serial controller
16	*ETHERNET* RJ-45 Connector	Connect to a PC via a LAN
17	*ETH RESET* Button	Press to reset to the factory default IP parameters: IP number – 192.168.1.39 Mask – 255.255.255.0 Gateway – 192.168.1.1 Depress the button while powering on the device. The device powers up with the factory default IP parameters
18	*REMOTE IR* Opening	Connect to an external IR receiver for controlling the device via and IR remote controller (see Section 3.3) Covered by a cap. The 3.5mm jack at the end of the internal IR connection cable fits into this opening
19	Mains Power Connector	Connect to the mains power
20	Mains Power Fuse	Fuse for protecting the device
21	Mains Power Switch	Switch for turning the device on or off

3.3 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver (Model: C-A35M/IRR-50). The external IR receiver can be located up to 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables (Model: C-A35M/A35F-50).

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable (P/N: 505-70434010-S) with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

4 Installing in a Rack

This section provides instructions for rack mounting the unit.

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0º to +40ºC (32º to 104ºF)
STORAGE TEMPERATURE:	-40º to +70ºC (-40º to 158ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

2. Once rack mounted, enough air will still flow around the machine.

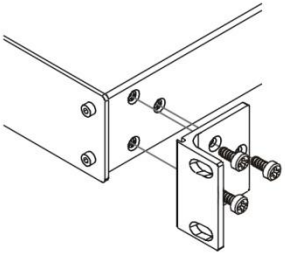
3. The machine is placed straight in the correct horizontal position.

4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

5 Connecting the VS-48HN 4x8 HDMI Matrix Switcher

Always switch off the power to each device before connecting it to your **VS-48HN**. After connecting your **VS-48HN**, connect its power and then switch on the power to each device.

To connect the VS-48HN 4x8 HDMI Matrix Switcher as illustrated in the example in Figure 3:

1. Connect up to four HDMI sources (for example, DVD players) to the IN HDMI connectors.
   You do not have to connect all the sources.
2. Connect the eight OUT HDMI connectors to up to eight HDMI acceptors (for example, LCD displays with built-in speakers).
   You do not have to connect all the outputs.
3. If required, connect a PC/controller to the RS-232 port (see Section 6.8) and/or the Ethernet port (see Section 6.9).
4. Connect the device to the mains electricity (not shown in Figure 3).
5. Power the device.
6. If necessary, acquire the EDID (see Section 6.2)

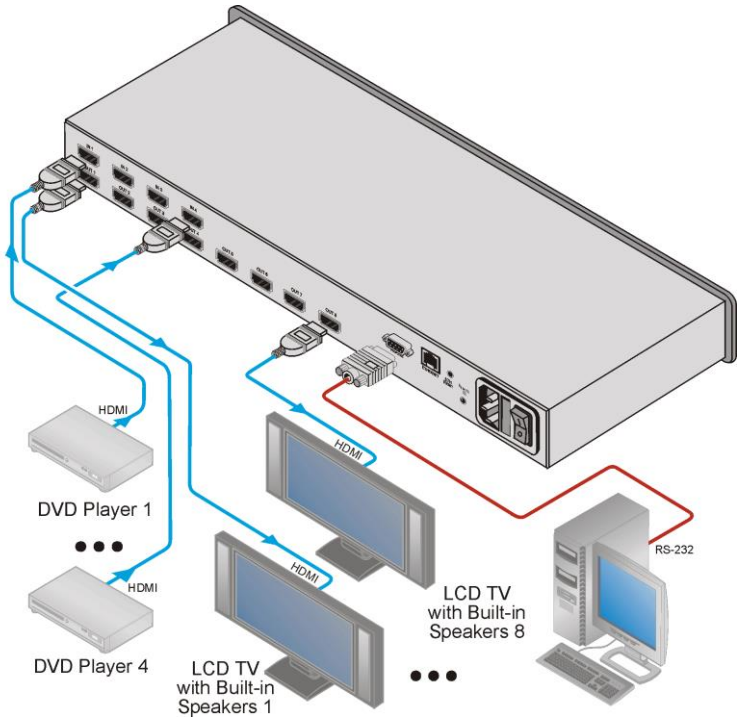


Figure 3: Connecting the VS-48HN 4x8 HDMI Matrix Switcher

6 Operating the VS-48HN 4x8 HDMI Matrix Switcher

This section describes:

- Switching an input to an output (see Section 6.1)
- Acquiring the EDID (see Section 6.2)
- Storing and recalling switch settings (see Section 6.3)
- Changing the port switching speed (see Section 6.4)
- Setting HDCP on or off (see Section 6.5)
- Resetting the **VS-48HN** IP parameters (see Section 6.6)
- Switching between Protocol 2000 and Protocol 3000 (see Section 6.7)
- Connecting to the **VS-48HN** via RS-232 (see Section 6.8)
- Connecting to the **VS-48HN** via Ethernet (see Section 6.9)
- Upgrading the firmware (see Section 6.10)

6.1 Switching an Input to an Output

To switch an input to an output:

- Press an output button followed by an input button to switch the selected input to the selected output

6.2 Acquiring the EDID

You can acquire the EDID from any of the following:

- One output set to one or more of the four inputs (see Section 6.2.1)
- Different outputs set to different inputs (see Section 6.2.2)
- The default EDID (see Section 6.2.3)

Note: Attempting to acquire the EDID from an output that does not have a display device connected to it results in the default EDID being acquired.

6.2.1 Acquiring the EDID from One Output

Note: You can assign the EDID from one output to any or all of the four inputs.

To acquire the EDID from a display device connected to one of the outputs:

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.

2. Press the input button to which the EDID is copied.
   The selected input number flashes on the display.

3. Select the output from which the EDID is to be acquired.

4. Press the EDID button.
   The EDID is stored when the display returns to normal and the EDID and STO buttons stop flashing.

6.2.2 Acquiring the EDID from Different Outputs to Different Inputs

To acquire the EDID from several outputs (for example, OUT 1 to IN 1 and OUT 6 to IN 3):

1. Connect the display devices to the outputs from which you want to acquire the EDIDs.

2. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.

3. Press the input button to which the EDID is copied (for example, IN 1).
   The selected input number flashes on the display.

4. Select the output from which the EDID is acquired (for example, OUT 1).

5. Press the IN 1 button.
   The IN 1 button stops flashing.

6. Press the next input button to which the EDID is copied (for example, IN 3).
   The selected input number flashes on the display.

7. Select the output from which the EDID is acquired (for example, OUT 6).

8. Press the IN 3 button.
   The IN 3 button stops flashing.

9. Press the input buttons to which you want to copy the EDID (for example, IN 1 and IN 3).

10. Make sure that the relevant input numbers flash on the display.

11. Press the EDID button.
    The process is complete when the display returns to normal.

6.2.3 Acquiring the Default EDID

To store the default EDID on a selected input (for example, Input 2):

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.

2. Press the input (for example, Input 2) to which the EDID is to be copied.
   The selected input number flashes on the display.

3. Press the OFF button until "0" (zero) appears on the display.

4. Press the EDID button.
   The default EDID is stored on the selected input when the display returns to normal.

6.3 Storing and Recalling a Preset

You can use the STO and RCL buttons to store up to 12 setups and then recall them using the OUT (1-8) and IN (9 -12) SELECTOR buttons (see Figure 4).

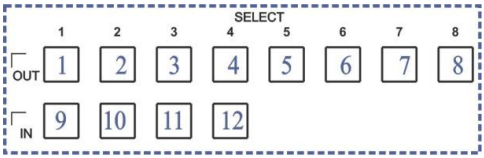


Figure 4: Store-Recall Button Configuration

To store a preset (for example, to preset 10):

1. Configure the switching as required for the preset.
2. Press the STO button.
   The STO button flashes.
3. Select an OUT or IN SELECT button to store the device setting (for example, IN 2 for preset 10).
4. Press the STO button to store the current setup.
   If you do not press the STO button within 10 seconds the procedure automatically times out.

To recall a preset (for example, preset 10):

1. Press the RCL button.
   The RCL button flashes.
2. Press the relevant OUT or IN button that stored the preset (for example, IN 2/preset 10).
3. Press the RCL button to recall the stored preset.
   The RCL button stops flashing.

6.4 Changing the Port Switching Speed

The switching speed can be set per port to any of the following:

- 3—Normal (default)
- 2—Fast
- 1—Extra fast

To change the port switching speed:

1. Ensure that the device is in normal switching mode, (that is, not Store, Recall or EDID mode).

2. Press the RCL and EDID buttons at the same time.
   The RCL and EDID buttons flash, and the display indicates the switching speed mode of each port.
   IN 1, IN 2 and IN 3 are illuminated (red).

3. Press one or more (or ALL) of the OUT buttons to select the port to change.
   The selected port setting on the LED display flashes.

4. Press one of the IN 1/IN 2/IN 3 button to toggle the switching speed, (to Extra fast/Fast/Normal, respectively).
   The switching speed displayed changes for the selected ports.

5. Press the LOCK button to confirm the change.
   The switching speed for the selected port is changed and the device reverts to the normal switching mode.

Note: If the LOCK button is not pressed within about 12 seconds, the device exits the port speed switching mode automatically and all changes are lost.

6.5 Setting HDCP to On/Off

HDCP support can be enabled (On) or disabled (Off) for each of the HDMI inputs, allowing the source to transmit a non-HDCP signal if required (for example, when working with a Mac computer)

To set the HDCP:

1. Turn the power off on the machine.

2. Press and hold the IN 1, IN 2 and LOCK buttons simultaneously and turn the power on while pressing these buttons (you will need more than one person to perform this step).
   The machine is set to the HDCP enable/disable mode.

   The input front panel buttons' status indicates the HDCP state of each input:

   - HDCP enabled (ON) on an input – that input button is illuminated
   - HDCP disabled (OFF) on an input – that button is not illuminated

3. Press an input button to change its status.
   You can press one or more inputs.

4. Once you have changed the status of HDCP on the inputs as desired, press the EDID to save the changes and exit the HDCP enable/disable mode to return to normal operation.

Note: If the EDID button is not pressed within about 12 seconds, the device exits the port speed switching mode automatically and all changes are lost.

6.6 Resetting the IP Parameters

This procedure resets only the IP related parameters. All switching and preset values remain unchanged.

To reset the IP parameters to their default values (see Section 8):

- Press and hold the ETH Reset button on the rear panel while powering up the device

6.7 Switching Between Protocol 2000 and Protocol 3000

To switch from Protocol 2000 to Protocol 3000 and vice-versa **using the front panel buttons**:

- Press Output buttons 1 and 3 at the same time.
  Protocol 3000 is active.
- Press Output buttons 1 and 2 at the same time.
  Protocol 2000 is active.

Note that when sending consecutive protocol commands make sure to maintain at least a 200ms delay between commands.

After performing EDID get/store commands, a 1 sec delay is required before sending another protocol command.

6.8 Connecting via RS-232

You can connect to the **VS-48HN** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the product via RS-232:

- Connect the RS-232 9-pin D-sub on the rear panel of the **VS-48HN** via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

6.9 Connecting via Ethernet

You can connect to the **VS-48HN** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Section 6.9.1)
- Via a network hub, switch, or router, using a straight-through cable (see Section 6.9.2)

After connecting the **VS-48HN** to the Ethernet port, configure your local Ethernet port by following the instructions in the *Kramer Ethernet Configuration User Guide* available from http://www.kramerelectronics.com/support/product_downloads.asp.

Note: If you want to connect via a router and your IT system is based on IPv6, speak to your IT department for specific installation instructions.

6.9.1 Connecting the Ethernet Port Directly to a PC

You can connect the Ethernet port of the **VS-48HN** directly to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **VS-48HN** with the factory configured default IP address.

6.9.2 Connecting the Ethernet Port via a Network Hub or Switch

You can connect the Ethernet port of the **VS-48HN** to the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

6.10 Upgrading the Firmware

For instructions on upgrading the firmware see "*Upgrading the **VS-48HN** Firmware Using the STC Software*".

7 Technical Specifications

INPUTS:	4 HDMI Connectors
OUTPUTS:	8 HDMI Connectors
BANDWIDTH:	Up to 6.75Gbps data rate (2.25Gbps per graphic channel)
COMPLIANCE WITH HDMI STANDARD:	HDMI and HDCP
RESOLUTION:	Up to UXGA; 1080p
POWER CONSUMPTION:	100–240V AC, 50/60Hz, 40VA
CONTROLS:	Front panel buttons, infrared remote control transmitter, RS-232, Ethernet
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS:	19” x 10.9” x 1U (W, D, H)
WEIGHT:	2.3kg (5.1lbs) approx.
INCLUDED ACCESSORIES:	Power cord, IR transmitter, rack ”ears”
OPTIONS:	External remote IR receiver cable
Specifications are subject to change without notice at http://www.kramerelectronics.com	

8 Default Communication Parameters

RS-232			
Protocol 2000 (Default)		**Protocol 3000**	
Baud Rate	9600	Baud Rate	9600
Data Bits	8	Data Bits	8
Stop Bits	1	Stop Bits	1
Parity	None	Parity	None
Command Format	HEX	Command Format	ASCII
Example (Output 1 to Input 1)	0x01, 0x81, 0x81, 0x81	Example (Output 1 to Input 1)	#VID1>1<CR>

Switching Protocol			
P2000 –> P3000		**P3000 –> P2000**	
Command	0x38, 0x80, 0x83, 0x81	Command	#P2000<CR>
Front Panel	Press and hold Output 1 and Output 3 simultaneously	Front Panel	Press and hold Output 1 and Output 2 simultaneously

Ethernet			
IP Address	192.168.1.39	TCP Port	5000
Subnet Mask	255.255.255.0	UDP Port	50000

9 Default EDID

Monitor
Model name..... VS-48H
Manufacturer..... KMR
Plug and Play ID..... KRM0200
Serial number..... 1
Manufacture date..... 2010, ISO week 24

EDID revision..... 1.3
Input signal type..... Digital (DVI)
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 700 x 390 mm (31.5 in)
Power management..... Not supported
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... Not supported

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.640 - Ry 0.341
Green chromaticity..... Gx 0.286 - Gy 0.610
Blue chromaticity..... Bx 0.146 - By 0.069
White point (default).... Wx 0.284 - Wy 0.293
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 746 +hsync -vsync
Detailed timing #1..... 1920x1080p at 60Hz (16:9)
Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM

1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1280 x 720p at 60Hz - VESA STD
1280 x 800p at 60Hz - VESA STD
1440 x 900p at 60Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1400 x 1050p at 60Hz - VESA STD
1680 x 1050p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Not supported
Basic audio..... Supported
YCbCr 4:4:4..... Not supported
YCbCr 4:2:2..... Not supported
Native formats..... 1
Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1920x1080i at 50Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #4..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #5..... 1280x720p at 50Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
720 x 576p at 50Hz - EDTV (4:3, 16:15)
1280 x 720p at 50Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 3-channel, 24-bits at 44/48 kHz

CE speaker allocation data
Channel configuration.... 7.1
Front left/right..... Yes
Front LFE..... No
Front center..... Yes
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No

Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Report information
Date generated..... 08/03/2011
Software revision..... 2.52.0.857
Data source..... Real-time 0x0031
Operating system..... 5.1.2600.2.Service Pack 3

10 Kramer Protocol 2000

The Kramer Protocol 2000 RS-232/RS-485 communication uses four bytes of information as defined below. All the values in the table are decimal, unless otherwise stated.

MSB							LSB
1st Byte	DESTINATION	INSTRUCTION					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0

2nd Byte	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0

3rd Byte	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0

4th Byte			MACHINE NUMBER				
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0

1st Byte: Bit 7 – Defined as 0
D – DESTINATION:
0 – Sends information to the switchers (from the PC)
1 – Sends information to the PC (from the switcher)
N5…N0 – INSTRUCTION
The 6-bit INSTRUCTION defines the function performed by the switcher(s). If a function is performed using the machine's keyboard, these bits are set with the INSTRUCTION NO. performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value set in N5…N0).

2nd Byte: Bit 7 – Defined as 1
I6…I0 – INPUT
When switching (i.e. instruction codes 1 and 2), the 7-bit INPUT is set as the input number to be switched. If switching is done using the machine's front panel, these bits are set with the INPUT NUMBER switched. For other operations, these bits are defined according to the table.

3rd Byte: Bit 7 – Defined as 1
O6…O0 – OUTPUT
When switching (i.e. instruction codes 1 and 2), the 7-bit OUTPUT is set as the output number to be switched. If switching is done using the machine's front panel, these bits are set with the OUTPUT NUMBER switched. For other operations, these bits are defined according to the table.

4th Byte: Bit 7 – Defined as 1
Bit 5 – Don't care
OVR – Machine number override
M4…M0 – MACHINE NUMBER
This byte is used to address machines in a system by their machine numbers. When several machines are controlled from a single serial port, they are usually configured together and each machine has an individual machine number. If the OVR bit is set, then all machine numbers accept (implement) the command and the addressed machine replies. When a single machine is controlled over the serial port, always set M4…M0 to 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Instruction Codes for Protocol 2000				
Instruction		Definition for Specific Instruction		Notes
#	Description	Input	Output	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
56	CHANGE TO ASCII	0	Kramer protocol 3000	19
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it resets according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it performs the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code
01 85 88 83
was sent from the PC, then the switcher (machine 3) switches input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher sends HEX codes:
41 81 87 83
to the PC.
When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B 80 80 85
would be HEX codes
4B 80 81 85

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine sends its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):
7D 96 90 81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine sends its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D	83	85	81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D	D9	C3	81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E	82	81	82 (ie. request the number of outputs)

would be HEX codes

7E	82	90	82

ie. 16 outputs

NOTE 15 – When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) causes all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it performs any "video" instruction.

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 19 - After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

11 Protocol 3000

By default, the **VS-48HN** is set to Protocol 2000 (see Section 10) but is also compatible with Kramer's protocol 3000.

Note that the **VS-48HN** needs to be set to protocol 2000 in order to use the IR remote control.

The **VS-48HN** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes:

- Kramer Protocol 3000 syntax (see Section 11.1)
- Kramer Protocol 3000 commands (see Section 11.2)

11.1 Kramer Protocol 3000 Syntax

11.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*Destination_id@*	**Message**	CR

11.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

11.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	*Destination_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

11.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	*Sender_id@*	**Message**	CR LF

11.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	*device_id@*	**Command** SP [*Param1 ,Param2 …*] **result**	CR LF

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

11.1.3 Command Terms

Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

Parameters

A sequence of alphanumeric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string

Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.

Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character

'#' – For host command/query

'~' – For device response

Device address (Optional, for K-NET)

K-NET Device ID followed by '@'

Query sign

'?' follows some commands to define a query request.

Message closing character

CR – For host messages; carriage return (ASCII 13)

CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character

When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

11.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

11.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

11.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character (“|”). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

11.1.7 Maximum String Length

64 characters

11.2 Kramer Protocol 3000 Commands

Command	Short Form	Description	Permission
#		Protocol handshaking	End User
BUILD-DATE?		Read device build date	End User
CPEDID		Copy EDID data from the output to the input EEPROM	End User
DISPLAY?		Read if output is valid	End User
FACTORY		Reset to factory default configuration	
GEDID		Read EDID data	User SW Internal
GEDID-EXT		Read EDID data from external device connected to output	User SW Internal
HELP		List of commands	End User
IDV		Visual identify device	End User
INFO-IO?		Read in/out count	End User
INFO-PRST?		Read maximum preset count	End User
LDEDID		Load EDID data	User SW Internal
LOCK-FP	LCK	Lock front panel	Administrator
LOCK-FP?	LCK?	Read Lock front panel	End User
MODEL?		Read device model	End User
P2000		Switch to protocol 2000	End User
PROT-VER?		Read device protocol version	End User
PRST-LST?		Read saved presets list	End User
PRST-RCL		Recall saved preset	End User
PRST-STO		Store current connections to preset	End User
PRST-VID?		Read video connections from saved preset	End User
RESET		Reset device	Administrator
SIGNAL?		Read if input is valid	End User
SN?		Read device serial number	End User
VERSION?		Read device firmware version	End User
VID		Switch Video only	End User
VID?		Get Video switch state	End User

11.3 Kramer Protocol 3000 – Detailed Commands

This section describes the detailed commands list.

Command - **BUILD-DATE**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**BUILD-DATE?**	End User	Public
Description		**Syntax**	
Set:	Get device build date	#**BUILD-DATE**CR	
Get:	-	-	
Response			
~nn@**BUILD-DATE**SP*date*SP*time*CR LF			
Parameters			
date - Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day *time* - Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			

Command - **CPEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**CPEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Copy EDID data from the output to the input EEPROM	#**CPEDID**SP*src_type, src_id, dst_type, dest_bitmap*CR	
Get:	-	-	
Response			
~nn@**CPEDID**SP*src_stg, src_id, dst_type, dest_bitmap*CR LF			
Parameters			
src_type - *EDID* source type (usually output) – 0=input, 1=output, 2=Default EDID *src_id* - number of chosen source stage (1.. max number of inputs/outputs) *dst_type* - *EDID destination* type (usually input) 0=input, 1=output, 2=Default EDID *dest_bitmap* - bitmap representing destination IDs. Format: XXXX…X, where X is hex digit. The binary form of every hex digit represents corresponding destinations. Setting '1' says that EDID data has to be copied to this destination			
Response Triggers			
Response is sent to the com port from which the Set was received (before execution)			
Notes			
Destination bitmap size depends on device properties (for 64 inputs it is a 64-bit word) Example: bitmap 0x0013 means inputs 1,2 and 5 are loaded with the new EDID			

Command - **DISPLAY?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**DISPLAY?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get output HPD status	#**DISPLAY?** SP *out_id* CR	
Response			
~ nn@**DISPLAY** SP *out_id,status* CR LF			
Parameters			
out_id - output number *status* - HPD status according to signal validation – 0: Signal or sink is not valid, 1: Signal or sink is valid, 2: Sink and EDID is valid			
Response Triggers			
After execution, response is sent to the com port from which the Get was received Response is sent after every change in output HPD status ON to OFF Response is sent after every change in output HPD status OFF to ON and ALL parameters (new EDID, etc.) are stable and valid			

Command – FACTORY		Command Type – System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**FACTORY**	End User	-
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device to factory defaults configuration	#FACTORY CR	
Get :	-	-	
Response			
~nn@**BUILD-DATE** SP *date* SP *time* CR LF			
Notes			
This command deletes all user data from the device. The deletion can take some time.			

Command - **GEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**GEDID**	Administrator	Public
Get:	**GEDID?**	End User	Public
Description		**Syntax**	
Set:	Set EDID data from device	#**GEDID**SP*stage, stage_id* CR	
Get:	Get EDID support on certain input/output	#**GEDID?**SP*stage, stage_id* CR	

Response

Set:
Multi-line response:
~nn@**GEDID**SP*stage,stage_id,size*CR LF
EDID_dataCR LF
~nn@**GEDID**SP*stage,stage_id*SP**OK**CR LF
Get:
~nn@**GEDID**SP*stage,stage_id,size*CR LF

Parameters

stage - input/output – 0: input, 1:output, 2: default EDID
stage_id - number of chosen stage (1.. max number of inputs/outputs)
size - EDID data size. For Set, size of data to be sent from device, for Get, 0 means no EDID support

Response Triggers

Response is sent to the com port from which the Set (before execution) / Get command was received

Notes

For Get, size=0 means EDID is not supported

For old devices that do not support this command, ~nn@ ERR 002CR LF is received

Command - **HELP**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	2 options: 1. #**HELP**CR 2. #**HELP**SP*command_name*CR	

Response

1. Multi-line: ~nn@**Device available protocol 3000 commands:**CR LF*command*,SP*command*…CR LF
To get help for command use: HELP (COMMAND_NAME)CR LF
2. Multi-line: ~nn@**HELP**SP*command*:CR LF*description*CR LF**USAGE:***usage* CR LF

Command - **IDV**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**IDV**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set visual indication from device	#**IDV**CR	
Get:	-	-	
Response			
~nn@**IDV**SP**OK**CR LF			
Notes			
Using this command, some devices can light a sequence of buttons or LEDs to allow identification of a specific device from similar devices			

Command - **INFO-IO?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**INFO-IO?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get in/out count	#**INFO-IO?**CR	
Response			
~nn@**INFO-IO?**SP IN SP *inputs_count*, OUT SP *outputs_count* CR LF			
Parameters			
inputs_count - number of inputs in the unit *outputs_count* - number of outputs in the unit			

Command - **INFO-PRST?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**INFO-PRST?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get maximum preset count	#**INFO-PRST?**CR	
Response			
~nn@**INFO-PRST?**SP VID SP *preset_video_count*, AUD SP *preset_audio_count* CR LF			
Parameters			
preset_video_count - maximum number of video presets in the unit *preset_audio_count* - maximum number of audio presets in the unit			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **LDEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**LDEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Write EDID data from external application to device	Multi-step syntax (see following steps)	
Get:	None	None	

Communication Steps (Command and Response)

Step 1: #**LDEDID**SP*dst_type, dest_bitmask, size, safe_mode*CR

Response 1: ~nn@**LDEDID**SP*dst_type, dest_bitmask, size, safe_mode*SP**READY**CR LF or

~nn@**LDEDID**SP**ERRnn**CR LF

Step 2: If **ready** was received, send EDID_DATA

Response 2: ~nn@**LDEDID**SP*dst_type, dest_bitmask, size, safe_mode*SP**OK**CR LF or

~nn@**LDEDID**SP**ERRnn**CR LF

Parameters

dst_type - EDID destination type (usually input) – 0=input, 1=output, 2=Default EDID

dest_bitmask - bitmap representing destination IDs. Format: 0x********, where * is ASCII presentation of hex digit. The binary presentation of this number is a bit mask for destinations. Setting '1' means EDID data has to be copied to this destination

size - EDID data size

safe_mode - 0 - Device accepts the EDID as is without trying to adjust

1 - Device tries to adjust the EDID

EDID_DATA - data in protocol packets (see Section 11.3.1)

Response Triggers

Response is sent to the com port from which the **Set** (before execution)

Notes

When the unit receives the **LDEDID** command it replies with **READY** and enters the special EDID packet wait mode. In this mode the unit can receive only packets and not regular protocol commands. If the unit does not receive correct packets for 30 seconds or is interrupted for more than 30 seconds before receiving all packets, it sends timeout error ~nn@**LDEDID**SP**ERR01**CR LF and returns to the regular protocol mode. If the unit received data that is not a correct packet, it sends the corresponding error and returns to the regular protocol mode.

See Protocol Packet reference in Section 11.3.1

Command - **LOCK-FP**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**LOCK-FP**	End User	Public
Get:	**LOCK-FP?**	End User	Public
Description		**Syntax**	
Set:	Lock front panel	Option 1: #**LOCK-FP**SP*lock_mode*CR Option 2: #**LOCK-FP**SP*device_id,lock_mode*CR	
Get:	Get front panel lock state	Option 1: #**LOCK-FP?**CR Option 2: #**LOCK-FP?**SP*device_id*CR	
Response			
Set: Option 1: ~nn@**LOCK-FP**SP*lock_mode*SP**OK**CR LF Option 2: ~01@**LOCK-FP**SP*device_id,lock_mode*SP**OK**CR LF Get: Option 1: ~nn@**LOCK-FP**SP*lock_mode*CR LF Option 2: ~01@**LOCK-FP**SP*device_id, lock_mode*CR LF			
Parameters			
lock_mode - 0/OFF - unlocks the front panel buttons, 1/ON - locks the front panel buttons *device_id* - for K-Net controllers, select the button panel to lock. Locking is allowed only from the master			

Command – **MODEL?**		Command Type – System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**MODEL?**	End User	-
Description		**Syntax**	
Set:	-	-	
Get :	Get device model	#MODEL?CR	
Response			
~nn@**MODEL**SP*model_name*CR LF			
Parameters			
model_name – String of up to 19 printable ASCII chars			

Command - **P2000**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**P2000**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Switch to protocol 2000	#**P2000**CR	
Get:	-	-	
Response			
~nn@**P2000**SP**OK**CR LF			
Notes			
Available only for devices that support Protocol 2000 Protocol 2000 has a command to switch back to an ASCII protocol like Protocol 3000			

Command – PROT-VER?		Command Type – System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	-
Description		**Syntax**	
Set:	-	-	
Get :	Get protocol version	#PROT-VER?CR	
Response			
~nn@**PROT-VER**SP3000:*version*CR LF			
Parameters			
Version – Format: XX.XX where X is a decimal digit			

Command - **PROT-VER?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device protocol version	#**PROT-VER?**CR	
Response			
~nn@**PROT-VER**SP3000:*version*CR LF			
Parameters			
Version - XX.XX where X is a decimal digit			
Response Triggers			
Notes			

Command - **PRST-LST?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PRST-LST?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get saved preset list	#**PRST-LST?**CR	
Response			
~nn@**PRST-LST**SP *preset, preset, …* CR LF			
Parameters			
preset - preset number			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **PRST-RCL**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**PRST-RCL**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Recall saved preset list	#**PRST-RCL**SP *preset* CR	
Get:	-	-	
Response			
~nn@**PRST-RCL**SP *preset* CR LF			
Parameters			
preset - preset number			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **PRST-STO**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**PRST-STO**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Store current connections, volumes and modes in preset	#**PRST-STO**SP*preset* CR	
Get:	-	-	
Response			
~nn@**PRST-STO**SP *preset*CR LF			
Parameters			
preset - preset number			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			

Command - **PRST-VID?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PRST-VID?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get video connections from saved preset	#**PRST-VID?**SP*preset, out*CR #**PRST-VID?**SP*preset, **CR	
Response			
~nn@**PRST-VID**SP*preset, in>out* CR LF ~nn@**PRST-VID**SP*preset, in>1, in>2, in>3, …* CR LF			
Parameters			
preset - preset number *n* - input number or '0' if output disconnected > - connection character between in and out parameters *out* - output number or '*' for all outputs			
Notes			
In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL			
Examples			
Store current audio and video connections, volumes and modes to preset 5		#PRST-STO 5CR	~PRST-STO 5CR LF
Recall audio and video connections from preset 3		#PRCL 3CR	~PRST-RCL 3CR LF
Show source of video output 2 from preset 3		#PRST-VID? 3,2CR	~PRST-VID 3, 4>2CR LF

Command - **RESET**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**RESET**	Administrator	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device	#**RESET**CR	
Get:	-	-	
Response			
~nn@**RESET**SP**OK**CR LF			
Notes			
To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.			

Command - **SIGNAL**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**SIGNAL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get input signal lock status	#**SIGNAL?**SP*inp_id*CR	
Response			
~ nn@**SIGNAL**SP *inp_id,status* CR LF			
Parameters			
inp_id - input number *status* - lock status according to signal validation – 0: Signal or sink is not valid, 1: Signal or sink is valid, 2: Sink and EDID is valid			
Response Triggers			
After execution, a response is sent to the com port from which the Get was received Response is sent after every change in input signal status ON to OFF, or OFF to ON			
Notes			

Command - **SN?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device serial number	#**SN?**CR	
Response			
~nn@**SN**SP*serial_number*CR LF			
Parameters			
serial_number - 11 decimal digits, factory assigned			
Response Triggers			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

Command –**VERSION?**		Command Type – System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**VERSION?**	End User	-
Description		**Syntax**	
Set:	-	-	
Get :	Get version number	#VERSION?CR	
Response			
~nn@**VERSION**SPfirmware_versionCR LF			
Parameters			
firmware_version – Format: XX.XX.XXXX where the digits group are: major.minor.build version			

Command - VID		Command Type - Switch	
Command Name		**Permission**	**Transparency**
Set:	**VID**	End User	Public
Get:	**VID?**	End User	Public
Description		**Syntax**	
Set:	Set video switch state	#**VID**SP*in>out, in>out,…*CR	
Get:	Get video switch state	#**VID?**SP*out*CR #**VID?**SP * CR	

Response

Set: ~nn@**VID**SP*in>out* CR LF
~nn@**VID**SP*in>out* CR LF …
Get: ~nn@**VID**SP*in>out* CR LF
~nn@**VID**SP*in>1, in>2*, … CR LF

Parameters

in - input number or '0' to disconnect output
> - connection character between in and out parameters
out - output number or '*' for all outputs

Notes

When AFV switching mode is active, this command also switches audio and the unit replies with command ~AV.

Examples

When AFV switching mode is active, this command also switches audio and the unit replies with command ~AV.

Switch video and audio input 3 to output 7	#AV 3>7CR	~01@AV 3>7CRLF
Switch video input 2 to output 4	#V 2>4CR	~01@VID 2>4CRLF
Switch video input 4 to output 2 in machine 6	#6@VID 4>2CR	~06@VID 4>2CRLF
Disconnect video and audio output 4	#AV 0>4CR	~01@AV 0>4CRLF
Switch video input 3 to all outputs	#V 3>* CR	~01@VID 3>* CRLF
Chaining multiple commands	#AV 1>* **|** V 3>4, 2>2, 2>1, 0>2 **|** V 3>9 **|** A 0>1 **|** V? * CR 1. Switch audio and video from input 1 to all outputs 2. Switch video input 3 to output 4, video input 2 to output 2, video input 2 to output 1 and disconnect video output 2 3. Switch video input 3 to output 9 (non-existent) 4. Disconnect audio output 1 5. Get status of all video links Command processing begins after entering CR A response is sent for each command after processing	~AV 1>*CRLF ~VID 3>4 CRLF ~VID 2>2 CRLF ~VID 2>1 CRLF ~VID 0>2 CRLF ~VID ERR003 CRLF ~AUD 0>1CRLF ~VID 2>1, 0>2, 1>3, 3>4 CRLF

11.3.1 Packet Protocol Structure

The packet protocol is designed to transfer large amounts of data, such as files, IR commands, EDID data, and so on.

11.3.1.1 Using the Packet Protocol

To use the packet protocol:

1. Send a command: LDEDID
2. Receive Ready or ERR###
3. If Ready:
   - Send a packet
   - Receive OK on the last packet
   - Receive OK for the command
4. Packet structure:
   - Packet ID (1, 2, 3…) (2 bytes in length)
   - Length (data length + 2 for CRC) - (2 bytes in length)
   - Data (data length -2 bytes)
   - CRC - 2 bytes

01	02	03	04	05…	
Packet ID		Length		Data	CRC

5. Response:

~*NNNN*SP**OK**CR LF

Where *NNNN* is the received packet ID in ASCII hex digits.

11.3.1.2 Calculating the CRC

The polynomial for the 16-bit CRC is:

CRC-CCITT: 0x1021 = $x^{16} + x^{12} + x^5 + 1$

Initial value: 0000

Final XOR Value: 0

For a code example, see:

http://sanity-free.org/133/crc_16_ccitt_in_csharp.html

CRC example:

Data = “123456789”

Result => 0x31C3

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SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing

P/N: 2900-300153 Rev: 8